DBMS Lab Experiment 03

To understand DDL and DML Command

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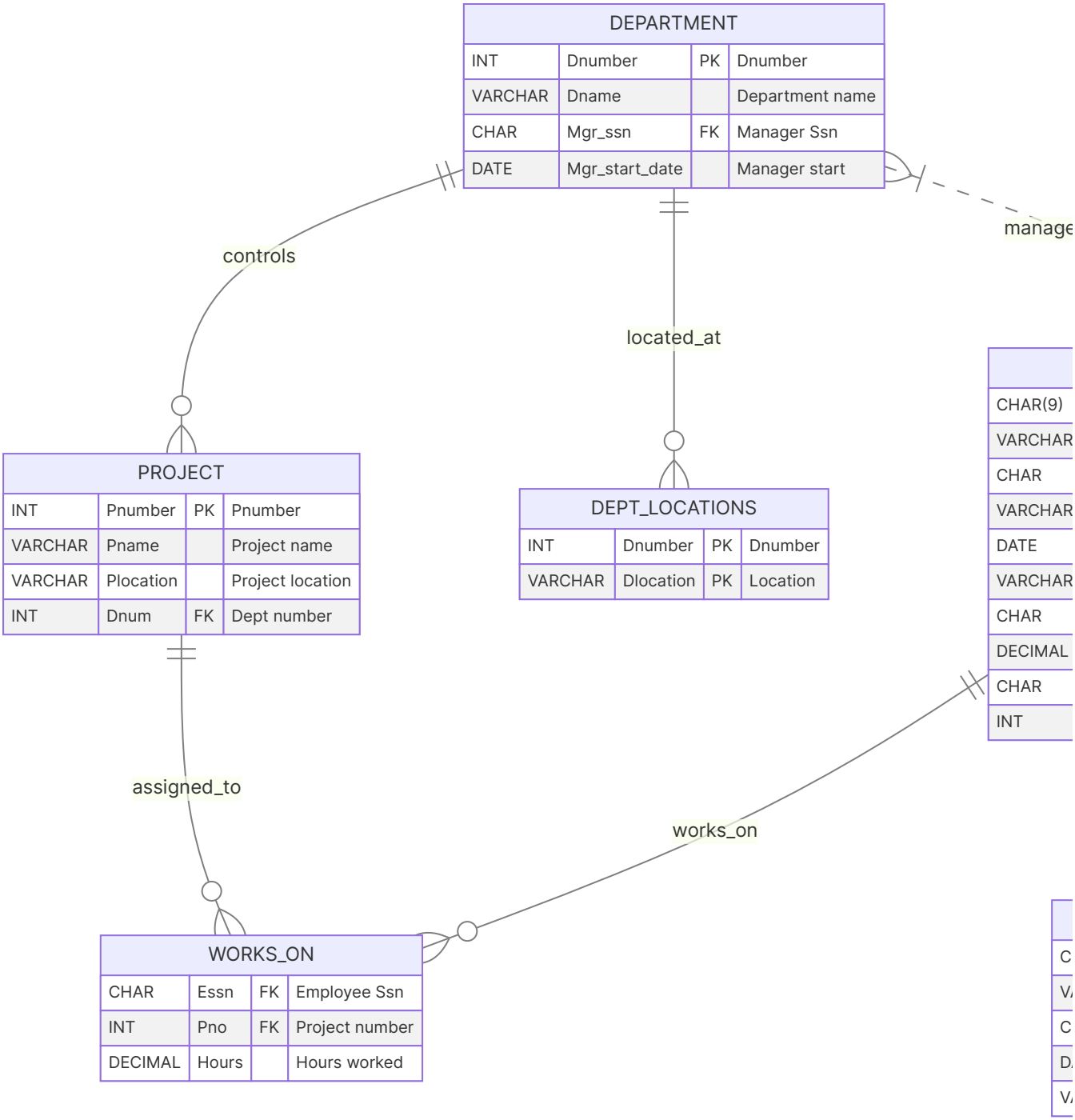
ER Diagram



ER → Relational Mapping

Relations:

1. EMPLOYEE (Ssn, Fname, Minit, Lname, Bdate, Address, Sex, Salary, Super_ssn, Dno)
2. DEPARTMENT (Dnumber, Dname, Mgr_ssn, Mgr_start_date)
3. DEPT_LOCATIONS (Dnumber, Dlocation)
4. PROJECT (Pnumber, Pname, Plocation, Dnum)
5. WORKS_ON (Essn, Pno, Hours)

6. DEPENDENT (Essn, Dependent_name, Sex, Bdate, Relationship)

Note: Primary keys are underlined. Foreign keys are added when creating the order and relationship tables.

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1. Table Creation

Creating EMPLOYEE Table

```
CREATE TABLE EMPLOYEE (
    Fname VARCHAR(15) NOT NULL,
    Minit CHAR(1),
    Lname VARCHAR(15) NOT NULL,
    Ssn CHAR(9) NOT NULL,
    Bdate DATE,
    Address VARCHAR(30),
    Sex CHAR(1),
    Salary DECIMAL(10,2),
    Super_ssn CHAR(9),
    Dno INT NOT NULL,
    PRIMARY KEY (Ssn),
    FOREIGN KEY (Super_ssn) REFERENCES EMPLOYEE(Ssn),
    FOREIGN KEY (Dno) REFERENCES DEPARTMENT(Dnumber)
);
```

Creating DEPARTMENT Table

```
CREATE TABLE DEPARTMENT (
    Dname VARCHAR(15) NOT NULL,
    Dnumber INT NOT NULL,
    Mgr_ssn CHAR(9) NOT NULL,
    Mgr_start_date DATE,
    PRIMARY KEY (Dnumber),
    UNIQUE (Dname),
    FOREIGN KEY (Mgr_ssn) REFERENCES EMPLOYEE(Ssn)
);
```

Creating DEPT_LOCATIONS Table

```sql
CREATE TABLE DEPT_LOCATIONS (
    Dnumber INT NOT NULL,
    Dlocation VARCHAR(15) NOT NULL,
    PRIMARY KEY (Dnumber, Dlocation),
    FOREIGN KEY (Dnumber) REFERENCES DEPARTMENT(Dnumber)
);
```

Creating PROJECT Table

```sql
CREATE TABLE PROJECT (
    Pname VARCHAR(15) NOT NULL,
    Pnumber INT NOT NULL,
    Plocation VARCHAR(15),
    Dnum INT NOT NULL,
    PRIMARY KEY (Pnumber),
    UNIQUE (Pname),
    FOREIGN KEY (Dnum) REFERENCES DEPARTMENT(Dnumber)
);
```

Creating WORKS_ON Table

```sql
CREATE TABLE WORKS_ON (
    Essn CHAR(9) NOT NULL,
    Pno INT NOT NULL,
    Hours DECIMAL(3,1),
    PRIMARY KEY (Essn, Pno),
    FOREIGN KEY (Essn) REFERENCES EMPLOYEE(Ssn),
    FOREIGN KEY (Pno) REFERENCES PROJECT(Pnumber)
);
```

Creating DEPENDENT Table

```sql
CREATE TABLE DEPENDENT (
    Essn CHAR(9) NOT NULL,
    Dependent_name VARCHAR(15) NOT NULL,
    Sex CHAR(1),
    Bdate DATE,
    Relationship VARCHAR(8),
    PRIMARY KEY (Essn, Dependent_name),
    FOREIGN KEY (Essn) REFERENCES EMPLOYEE(Ssn)
);
```

2. Inserting Sample Data

Data for DEPARTMENT

```
INSERT INTO DEPARTMENT (Dname, Dnumber, Mgr_ssn, Mgr_start_date) VALUES
('Research', 5, '333445555', '1988-05-22'),
('Administration', 4, '987654321', '1995-01-01'),
('Headquarters', 1, '888665555', '1981-06-19');
```

Data for EMPLOYEE

```
INSERT INTO EMPLOYEE (Fname, Minit, Lname, Ssn, Bdate, Address, Sex, Salary,
Super_ssn, Dno) VALUES
('John', NULL, 'Smith',    '123456789', '1965-01-09', '731 Fondren, Houston
TX', 'M', 30000.00, '333445555', 5),
('Franklin', NULL, 'Wong', '333445555', '1965-12-08', '638 Voss, Houston
TX',     'M', 40000.00, '888665555', 5),
('Alicia', NULL, 'Zelaya', '999887777', '1968-01-19', '3321 Castle, Spring
TX',   'F', 25000.00, '987654321', 4);
```

Data for PROJECT

```
INSERT INTO PROJECT (Pname, Pnumber, Plocation, Dnum) VALUES
('ProductX', 1,  'Bellaire', 5),
('ProductY', 2,  'Sugarland', 5),
('ProductZ', 3,  'Houston',   5),
('Computerization', 10, 'Stafford', 4),
('Reorganization', 20, 'Houston', 1),
('Newbenefits', 30, 'Stafford', 4);
```

Data for WORKS_ON

```
INSERT INTO WORKS_ON (Essn, Pno, Hours) VALUES
('123456789', 1,  32.5),
('123456789', 2,   7.5),
('666884444', 3,  40.0),
('453453453', 1,  20.0),
('453453453', 2,  20.0),
('333445555', 2,  10.0),
('333445555', 3,  10.0),
```

```
('333445555',10,  10.0),
('333445555',20,  10.0),
('333445555',20,  10.0),
('999887777',30,  30.0),
('999887777',10,  10.0),
('987987987',10,  35.0),
('987987987',30,   5.0),
('987654321',30,  20.0),
('987654321',20,  15.0),
('888665555',20,  NULL);
```

Data for DEPENDENT

```
INSERT INTO DEPENDENT (Essn, Dependent_name, Sex, Bdate, Relationship)
VALUES
('333445555', 'Alice',     'F', '1986-04-04', 'Daughter'),
('333445555', 'Theodore',  'M', '1983-10-25', 'Son'),
('333445555', 'Joy',       'F', '1958-05-03', 'Spouse'),
('987654321', 'Abner',     'M', '1942-02-28', 'Spouse'),
('123456789', 'Michael',   'M', '1988-01-04', 'Son'),
('123456789', 'Alice',     'F', '1988-12-30', 'Daughter'),
('123456789', 'Elizabeth', 'F', '1967-05-05', 'Spouse');
```

Data for DEPT_LOCATIONS

```
INSERT INTO DEPT_LOCATIONS (Dnumber, Dlocation) VALUES
(1, 'Houston'),
(4, 'Stafford'),
(5, 'Bellaire'),
(5, 'Houston'),
(5, 'Sugarland');
```

---

3. Exercise on Retrieving Records

Q 1: Find the first and last names of all employees

```
SELECT Fname, Lname FROM EMPLOYEE;
```

Result

Fname	Lname
John	Smith
Franklin	Wong
Alicia	Zelaya
...	...

Q 2: Retrieve the entire contents of the EMPLOYEE table

```
SELECT * FROM EMPLOYEE;
```

Result

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Sup
John		Smith	123456789	1965-01-09	731 Fondren, Houston TX	M	30000.00	333
Franklin		Wong	333445555	1965-12-08	638 Voss, Houston TX	M	40000.00	888
Alicia		Zelaya	999887777	1968-01-19	3321 Castle, Spring TX	F	25000.00	987
...	...	...	...	...	...	...	...	...

Q 3: List project names and locations

```
SELECT Pname, Plocation FROM PROJECT;
```

Result

Pname	Plocation
ProductX	Bellaire
ProductY	Sugarland
ProductZ	Houston

Pname	Plocation
...	...

Q 4: List works_on entries with hours greater than 30

```
SELECT * FROM WORKS_ON WHERE Hours > 30;
```

Result

Essn	Pno	Hours
123456789	1	32.5
666884444	3	40.0
987987987	10	35.0
...	...	...

Q 5: Find dependents of employee '333445555'

```
SELECT Dependent_name, Relationship FROM DEPENDENT WHERE Essn = '333445555';
```

Result

Dependent_name	Relationship
Alice	Daughter
Theodore	Son
Joy	Spouse

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4. Exercise on Updating Records

Q 1: Change the salary of employee with Ssn '123456789' to 32000

```
UPDATE EMPLOYEE
SET Salary = 32000.00
WHERE Ssn = '123456789';
```

Q 2: Change project 'Computerization' location to 'Houston'

```
UPDATE PROJECT
SET Plocation = 'Houston'
WHERE Pname = 'Computerization';
```

Q 3: Set NULL hours in WORKS_ON to 0.0

```
UPDATE WORKS_ON
SET Hours = 0.0
WHERE Hours IS NULL;
```

---

5. Exercise on Deleting Records

Q 1: Delete dependents named 'Joy' for employee '333445555'

```
DELETE FROM DEPENDENT
WHERE Essn = '333445555' AND Dependent_name = 'Joy';
```

Q 2: Delete projects that have no assignments in WORKS_ON

```
DELETE FROM PROJECT
WHERE Pnumber NOT IN (SELECT Pno FROM WORKS_ON);
```

Q 3: Delete department with Dnumber = 1

```
DELETE FROM DEPARTMENT WHERE Dnumber = 1;
-- Note: This will fail if referenced by foreign keys; remove referencing
rows first or use ON DELETE CASCADE if intended.
```

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6. Exercise on Altering Table Structure

Q 1: Add a Telephone column to EMPLOYEE

```sql
ALTER TABLE EMPLOYEE
ADD Telephone VARCHAR(15);
```

Q 2: Change Salary column precision to DECIMAL (12,2) (Postgres example)

```sql
ALTER TABLE EMPLOYEE
ALTER COLUMN Salary TYPE DECIMAL(12,2);
```

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7. Exercise on Deleting Table Structure

Q 1: Drop DEPENDENT table

```sql
DROP TABLE DEPENDENT;
```

Verification Queries

View All Tables

```sql
SELECT table_name
FROM information_schema.tables
WHERE table_schema = 'public';
```

View Table Structure (psql meta-command)

```
\d EMPLOYEE
\d DEPARTMENT
\d PROJECT
```

View Table Structure (SQL)

```sql
SELECT column_name, data_type, character_maximum_length
FROM information_schema.columns
WHERE table_name = 'employee';
```

Count Records

```sql
SELECT COUNT(*) AS EmployeeCount FROM EMPLOYEE;
SELECT COUNT(*) AS ProjectCount FROM PROJECT;
SELECT COUNT(*) AS DepartmentCount FROM DEPARTMENT;
```